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No. LXXI.

Observations for determining the Latitude and Longitude of the Town of Natchez—By ANDREW ELLICOT, Esq. Commissioner on the part of the United States, for running the line of Demarkation between them and the Spanish Territory. Communicated to the Society by R. PATTERSON.

Read, November 16, 1798.

1797. Plane of the Sector East.

March	$\left\{ \begin{array}{l} 4^{\text{th}} \text{ Observed Zenith distance of Pollux} \\ 5^{\text{th}} \text{ do.} \\ 7^{\text{th}} \text{ do.} \\ 8^{\text{th}} \text{ do.} \end{array} \right.$	3	2	58	S.
		3	3	1	
		3	2	58	
		3	2	56	
Do.	$\left\{ \begin{array}{l} 5^{\text{th}} \text{ Observed Zenith distance of Castor} \\ 7^{\text{th}} \text{ do.} \\ 8^{\text{th}} \text{ do.} \end{array} \right.$	0	45	56	N.
		0	45	55	
		0	45	56	
Do.	$\left\{ \begin{array}{l} 5^{\text{th}} \text{ Observed Zenith distance of B. Tauri} \\ 7^{\text{th}} \text{ do.} \\ 8^{\text{th}} \text{ do.} \end{array} \right.$	3	7	59	S.
		3	7	57	
		3	8	0	

Plane of the Sector West.

Do.	$\left\{ \begin{array}{l} 9^{\text{th}} \text{ Observed Zenith distance of Pollux} \\ 10^{\text{th}} \text{ do.} \\ 11^{\text{th}} \text{ do.} \end{array} \right.$	3	4	0	S.
		3	3	59	
		3	3	56	
Do.	$\left\{ \begin{array}{l} 10^{\text{th}} \text{ Observed Zenith distance of Castor} \\ 11^{\text{th}} \text{ do.} \\ 12^{\text{th}} \text{ do.} \end{array} \right.$	0	44	55	N.
		0	44	57	
		0	44	50	
April		0	44	56	
March	$\left\{ \begin{array}{l} 14^{\text{th}} \text{ Observed Zenith distance of B. Tauri} \\ 15^{\text{th}} \text{ do.} \\ 16^{\text{th}} \text{ do.} \\ 17^{\text{th}} \text{ do.} \\ 18^{\text{th}} \text{ do.} \\ 19^{\text{th}} \text{ do.} \\ 20^{\text{th}} \text{ do.} \\ 21^{\text{st}} \text{ do.} \\ 22^{\text{d}} \text{ do.} \\ 23^{\text{d}} \text{ do.} \end{array} \right.$	3	8	58	S.
		3	8	58	
		3	8	54	
		3	8	55	
		3	8	57	
		3	8	56	

THE

THE RESULTS.

Mean observed Zenith distance of Polliux with the plane of the Sector E.	°	'	"	
	3	2	58.25	
Mean observed Zenith distance of Pollux with the plane of the Sector W.	°	'	"	
	3	3	58.3	
Mean or correct Z. D.	°	'	"	
Refraction				+
	3	3	28.27	
				+
True Z. D.	°	'	"	
	3	3	31.27	S.
Mean declination of Pollux to the beginning of 1796	28	30	19.8	N.
Annual precession till the 15 th March, 1797			—	9.1
Aberration			+	0.8
Nutation			+	3.4
Semi-annual equation			+	0.3
True declination	28	30	15.2	
True Z. D. add	3	3	31.3	
Latitude	31	33	46.5	
Mean observed Zenith distance of Castor with the plane of the Sector E.	°	45	55.9	
Mean observed Zenith distance of Castor with the plane of the Sector W.	°	44	54.5	
Mean or correct observed Zenith distance	°	45	25.2	
Refraction			+	0.75
True Zenith distance	°	45	25.95	
Mean declination of Castor to the beginning of 1796	32	19	10.4	
Annual precession till the 15 th March, 1797			—	8.5
Aberration			+	2.1
Nutation			+	6.9
Semi-annual equation			+	0.4
True declination of Castor March 15 th 1797	32	19	11.4	N.
True Zenith distance	—45		25.9	
Latitude	31	33	45.5	
				Mean

Mean observed Zenith distance of B. Tauri with the plane of the Sector E.	°	'	''	58.7
Mean observed Zenith distance of B. Tauri with the plane of the Sector W.	3	8		56.3
Mean or correct Zenith distance	3	8		27.5
Refraction				+ 3.1
True Zenith distance	3	8		30.6
Mean declination of B. Tauri to the beginning of 1796	28	25	15.2	
Annual precession till the 15 th March 1797				+ 5.1
Aberration				+ 1.7
Nutation				- 1.0
Semi-annual equation				+ 0.5
True Zenith distance add	28	25	21.5	
Latitude	3	8		30.6
Latitude by Pollux	°	'	''	31 33 46.5
Do. by Castor	31	33		45.5
Do. by B. Tauri	31	33		52.1
Mean	31	33	48	Latitude of the Town of Natchez.
	3 N			OBSERVATIONS

LATITUDE AND LONGITUDE

OBSERVATIONS FOR THE LONGITUDE.

Observed the times, and distances of the Moon and Sun's nearest limbs.

1797	Times.			Distances.			Longitude W. from Philad.		
	h	'	''	°	'	''	°	'	''
March 3 ^d	2	59	30	59	46	58	16	23	30
3 ^d	3	54	50	60	3	51	16	26	45
3 ^d	4	28	44	60	13	8	16	15	00
4 th	2	10	27	72	6	29	16	24	45
4 th	4	53	17	72	58	9	16	10	45
6 th	2	37	42	98	12	14	15	52	30*
17 th	21	9	31	109	41	5	16	13	30
21 st	21	25	36	65	49	9	16	2	00
21 st	21	36	30	65	45	56	16	15	00
22 ^d	21	46	24	54	48	32	16	10	00
23 ^d	21	26	7	43	52	28	16	25	45

OBSERVATIONS ON A LUNAR ECLIPSE.

1797	Dec. 3 ^d	Beginning	h	'	''	16	10	30
		Total Darkness	9	37	35	16	18	00
		End of total darkness	11	18	59	16	9	45
		End of the Eclipse	12	18	12	16	11	00
<hr/>								
Mean						16	13	55
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OBSERVATIONS

* If this observation, which appears to have been inaccurate, be stricken out, the mean of the remaining ten will agree with the mean of a like number of observations made on the eclipses of Jupiter's satellites, within a *single second*. This fact is a strong proof in favour of the accuracy of this method of determining the longitude of places.

R. P.

Note, to face page 451.

All the observations for the longitude of Natchez after the 23d of March, are entered as observed by the clock, and will therefore require a correction to reduce them to mean solar time, which may readily be done from the following statement of the errors of the clock, with its rate of going, at different periods during the course of the observations.

1797.								
June 12 th	Clock too fast mean time		3	55	,	"	2.9	daily los.
17 th	3	40.6	—	do.
26 th	The clock was taken out of the tent, and removed into a house where it was not attended to till							
Sept. 28 th	when I cleaned it, and set it agoing.				,	"		
29 th	Clock too fast mean time		9	30.4	—	"	9.1	daily gain.
30 th	do.	.	.	9	39.5	—	9.7	do.
Oct. 7 th	do.	.	.	10	47.4	—	11.4	do.
18 th	do.	.	.	12	53.0	—	11.4	do.
26 th	do.	.	.	14	24.3	—		
Nov. 22 ^d	Clock ran down, wound it up and set it agoing, lowered the bob of the pendulum.							
24 th	Clock too fast mean time.		16	22	,	"		
26 th	do.	.	.	16	28	—	3.0	daily gain.
Dec. 4 th	do.	.	.	16	30	—	0.2	do.
6 th	do.	.	.	16	37	—	3.5	do.
8 th	do.	.	.	16	38.5	—	0.7	do.
16 th	do.	.	.	16	40.5	—	0.2	do.
18 th	do.	.	.	16	44	—	1.7	do.
21 st	do.	.	.	16	52	—	2.7	do.
1798.								
Jan. 1 st	do.	.	.	17	31	—		
2 ^d	Stopped the clock about 19 minutes and lowered the bob of the pendulum a small matter, but scarcely discernible with a magnifying-glaſs.							
5 th	Clock too slow mean time.		1	21	,	"	0.3	daily gain.
8 th	do.	.	.	1	20	—	2.0	daily los.
9 th	do.	.	.	1	22	—	1.0	do.
15 th	do.	.	.	1	28.2	—		

OBSERVATIONS MADE ON THE SATELLITES OF JUPITER.

		Long. W. from Philad.							
1797									
June 12 th	Immersion of 1 st Satellite		15	28	25	16	17	30	
Sept. 28 th	do.	do.	14	30	10	16	22	15	
30 th	do.	do.	8	59	19	16	19	45	
Oct. 25 th	Emerision of	do.	5	55	12	16	10	15	
Nov. 24 th	do.	do.	8	7	33	16	16	00	
Dec. 7 th	do. of 2 ^d	do.	7	56	31	16	17	45	
17 th	do. of 1 st	do.	8	24	30	16	16	00	
24 th	do.	do.	10	21	1	16	19	30	
1798	{ 8 th	do. of 2 ^d	do.	7	22	12	16	12	15
Jan. { 9 th	do. of 1 st	do.	8	23	10	16	15	45	
						Mean	16	16	42

From the above it appears that the Longitude deduced from the eclipses of Jupiter's satellites exceeds that deduced from the lunar observations including the eclipse of the Moon on the 3d of December last, by 2' 47" — But I am of the opinion that the most dependence is to be placed upon the eclipses of Jupiter's satellites, which together with the Lunar eclipse may be further corrected if any corresponding observations should happen to have been made in any place where the Longitude has been accurately settled. The following statement in which the Longitude deduced from the eclipses of the satellites is given double the weight of that deduced from the Lunar observations will certainly give the Longitude of the town of Natchez with great accuracy.

16°	13'	55"
16	16	42
16	16	42

Mean 16 15 46 Longitude West from Philadelphia.